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OBSERVATIONS ON THE DENTITION OF ACHATINELLIDÆ.

BY H. M. GWATKIN AND HENRY SUTER, WITH PREFATORY NOTE BY H. A. PILSBRY.

The dentition of the *Achatinellidæ* has already been investigated by Heynemann[1] and by W. G. Binney. The latter author, in co-operation with Thomas Bland,[2] has published several papers upon the subject, and to him is due the credit of discovering that within the group commonly known as *Achatinella*, two extremely different types of dentition exist.

The first, including *Achatinella s. str.*, *Partulina* and *Tornatellina* is characterized by an excessively delicate jaw (which is completely lost in potash preparations), and teeth arranged *en chevron*, in very oblique transverse rows, all of the peculiar form shown in Plate XI, fig. 52, and found also in *Athoracophorus*, etc. The shells of this group are glossy or brilliant, and the animal is arboreal.

The second type is seen in the groups *Amastra*, *Labiella*, *Newcombia*, *Laminella* and *Leptachatina*. Here the jaw is stronger, arched, and smooth or striate. The teeth are arranged in nearly straight transverse rows, and are of the type found in *Achatina* and *Rumina*, differing from the teeth of Helicidæ in the narrowness of the rhachidian row (see Pl. XI, fig. 56). The shell is dull in the majority of the species of this group, and the animal is in most cases terrestrial in habit.

Allied to the last in dentition, but distinct in its strongly ribbed jaw, is the genus *Carelia*, which thus constitutes a third primary group of Achatinellidæ.

These three groups are, there can be no reasonable doubt, of generic rank, and will bear the following names:

1. Genus ACHATINELLA Swainson, 1828. Contains the sectional divisions mentioned above, with some others. Of this generic term, *Helicter* of Pease and Fischer is a synonym. There is no reason-

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[1] Malak. Bl., 1869. *A. bulimoides*.

[2] Annals of the Lyceum of Nat. Hist. of New York, X, p. 331, 1873; Ibid. XI, p. 190; Annals of the N. Y. Acad. Sciences, III, pp. 96, 103.

able excuse for reviving Férussac's term *Helicteres*, for it was not intended as a generic or sub-generic name by Férussac, and is improper in form. Its use would open the door to an endless series of vagaries in nomenclature, as any one who examines Férussac's original publication may see.

2. Genus LEPTACHATINA Gould, 1848. Contains *Amastra*, *Newcombia*, etc.

3. Genus CARELIA H. and A. Ad., 1855.

The relationships of these genera and their subgenera will probably be decided by a study of their genitalia, which the writer hopes to undertake later; and these data will also aid in deciding whether the Achatinellidæ constitute a separate family, or are merely a division of Achatinidæ.

The following notes materially increase the list of species of which the dentition is known, and tend to strengthen the views advanced by Binney in the publications noticed above.

THE DENTITION of THE ACHATINELLÆ. By H. M. GWATKIN.

Molluscous radulæ are in general fairly uniform in the species of a genus, and form a very trustworthy character. The chief anomalies are in a few families like the Buccinidæ, where the individual variation is greater than the specific, and in a few species where radulæ of two or more types are found, like *Phasianella* and *Calliostoma* among the marine genera, *Bulimulus* and *Cylindrella* among the terrestrial.

Achatinella is a conspicuous instance of the latter class. We find in it two well-marked and very distinct types of radula, viz.:

(a). Jaw missing, radula broad, oblong, teeth very numerous, *en chevron* (rows sloping obliquely backward). Centrals (if present), laterals and marginals, all of the same type: Base narrow, head rather broad, with four, five, six or seven small tentacles (exactly as in *Janella* and *Tornatellina* and the marginals only of *Succinea*).

To this section belong:

Achatinella **nivea* Bald.
A. **Anceyana* Bald.
A. **bella* Rve.
A. **canaliculata* Bald.
A. *cinnamomea* Pfr.
A. *Dwightii* Newc.
A. *eburnea* Gul.
A. **Hawaiiensis* Bald. *Formula: 123—125 x 120=30,120*
A. *Horneri* Bald.
A. *marmorata* Gld.
A. **Mighelsiana* Pfr.
A. *Natti* Bald. and Hartm.
A. *perdix* Rve.
A. *proxima* Pse.
A. **pulcherrima* Swains.
A. *Redfieldii* Newc.
A. *rhodoraphe* Sm.
A. *sulcata* Pfr.
A. **tessellata* Newc.
A. **virgulata* Migh.
Auriculella brunnea Smith.

All these are practically indistinguishable, except that those marked with an asterisk seem to have a central tooth.

(b). Jaw arcuate, strong, not ribbed. Radula oblong, not wide. Teeth quadrate, in nearly straight rows. Centrals small, narrow, sometimes faintly tricuspid; laterals larger, bicuspid; marginals bicuspid or multicuspid as in *Helix*.

To this section belong:

Achatinella assimilis Newc., *27.1.27 x 98=5,390*
A. helvina Bald. *32.1.32 x 108=7,020*
A. labiata Newc.
A. Mastersi Newc.
A. nana Bald.
A. pullata Bald. *28.1.28 x 99=5,643*
A. similaris Hartm.
A. umbrosa Bald.

Here again, though there are small differences in the number of teeth, the varieties of shape are very trifling. The central tooth of *A. helvina* is a little wider than usual, and the marginals of *A. umbrosa* take a peculiar form; but neither of these variations seems important.

ON THE DENTITION OF SOME NEW SPECIES OF HELICTER. By HENRY SUTER.

Some time ago Mr. D. D. Baldwin kindly sent me the animals of some species of *Helicter* for examination of their dentition, and I herewith give a short report.

Helicter (Apex) Cookei Baldwin.

Helicter (Bulimella) Lyonsiana Baldwin.

Helicter (Partulina) Dolei Baldwin.

These three species perfectly agree in the peculiarity of their dentition. There is no jaw, only a chitinous, transparent membrane Pl. XI, fig. 55, a, covering the lips. The radula, Pl. XI, fig. 55, b, forms a tube, compressed sidewise, with numerous folds; part of it is bent backward anteriorly, forming a collar. The teeth of the radula Pl. XI, fig. 52, ∞ 1 ∞, form oblique rows at an angle of about 80°. The rhachidian tooth is long and slender, with a small reflection and two minute cutting points in *H. Lyonsiana*, no reflection could be seen in the two other species. The laterals and marginals are all alike, the denticles varying in number from five to six, in the last marginals from four to two; these teeth very much resemble the marginals of *Succinea*. The dentition is the same in all the three species, though they belong to different sections of *Helicter*, all of which are arboreal.

Helicter (Amastra) rubicunda Baldwin.

Helicter (Amastra), n. sp.

These two species, belonging to the same section, differ very much in dentition from the foregoing species. The jaw, Pl. XI, fig. 54, is solid, dark brown, horse-shoe-shaped, and beautifully finely striated vertically. The radula is tongue-shaped, the teeth arranged in almost straight transverse rows, and they are very much the same in both species, varying only in their number. Thus *Amastra rubicunda* has the formula 18.10.1.10.18 and *Amastra* n. sp. 22.12.1.12.22. It is hardly necessary to give a description of the radulæ, fig. 56, showing the most characteristic teeth of *A. rubicunda.* It may, however, be mentioned that the rhachidian and the laterals resemble somewhat those of *Achatina,* but the marginals are pectinate. The species of *Amastra* are not arboreal, but live on the earth.

Christchurch, New Zealand, August 8, 1894.